APPENDIX I
COMPUTATION OF MASS EMISSION FACTORS FOR WIND EROSION

I.1.0 Computation of Mass Emission Factors for Wind Erosion

Mass emission factors due to wind erosion of overburden, waste rock, and sub-ore piles were computed by the equation (Hu76)

$$EF = aIKCLV \qquad (I\text{-}1)$$

where,

EF = emission factor, MT/hectare-yr,
a = the portion of total wind erosion losses that would be measured as suspended particulates - a has the value of 0.025 for rocky, gravelly surfaces (Hu76),
I = soil erodibility - I has the value of 85 MT/hectare-yr for rocky, gravelly surfaces (Hu76),
K = surface roughness factor, assumed to be 1.0,*
C = climatic factor - reported to be 1.0 for New Mexico and 0.40 for Wyoming mining regions (Hu76),
L = unshielded field width factor - assumed to be 1.0,* and
V = vegetative cover factor - assumed to be 1.0*.

Substituting the assigned values into the equation yields an emission factor of 2.12 MT/hectare-yr for New Mexico mines and 0.850 MT/hectare-yr for Wyoming mines. These factors are applied with appropriate parameters in Sections 3.3.4.1 and 3.4.4.3 to estimate the average annual contaminant emissions due to wind erosion.

The mass emission factors due to wind erosion of the ore stockpiles were computed by the equation (Bo78)

$$EF = 0.025 \frac{(S)}{1.5} \frac{(D)}{90} \frac{(d)}{235} \frac{(f)}{15} \qquad (I\text{-}2)$$

*Dale, J.T., 1979, Air Program Branch, U.S. Environmental Protection Agency, Region VIII, Denver, CO, Memo Concerning Uranium Resources Development Company's Mining Operation in San Juan County, Utah - PDS Permit Requirements.

where,

EF = emission factor, kg of dust per annual MT of material put through storage cycle,
S = silt content - assumed to be 3.0,*
D = duration of storage - 41 days,
d = dry days per year - reported to be 273 days at Casper, WY and 306 days at Albuquerque, NM (DOC77), and
f = percent of the time the wind speed exceeds 19.3 km/hr - reported to be 49 percent at Casper, WY and 20 percent at Albuquerque, NM (DOC51-60).

Substituting the assigned values into Equation I-2 provides emission factors related to ore storage piles at mines in New Mexico and Wyoming of 0.040 kg/MT and 0.086 kg/MT, respectively. These factors are applied with the appropriate parameters in Sections 3.3.4.1 and 3.4.4.3 to estimate the average annual contaminant emissions from ore stockpiles due to wind erosion.

I.2.0 References

Bo78 Bohn, R., Cuscino, T., and Cowherd, C., 1978, "Fugitive Emissions from Integrated Iron and Steel Plants," U.S. Environmental Protection Agency Report, EPA-600/2-78-050.

DOC51-60 Department of Commerce, U.S. Weather Bureau, 1951-1960, "Climatography of the United States Series 82 -- Decennial Census of the United States Climate."

DOC77 Department of Commerce, National Oceanic and Atmospheric Administration, 1977, "Climatological Data - National Summary," Volume 28, No. 13.

Hu76 Hubbard, S.J., 1976, "Evaluation of Fugitive Dust Emissions from Mining: Task 1 Report - Identification of Fugitive Dust Sources Associated with Mining," Report prepared by PEDCO-Environmental Specialists, Inc. for the U.S. Environmental Protection Agency, Las Vegas, NV.